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Educational Affordances of Mobile Virtual Reality

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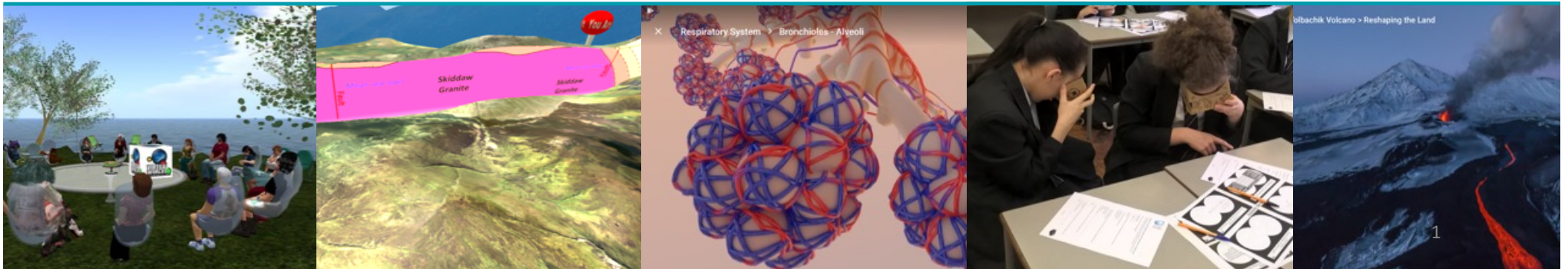
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Educational Affordances of Mobile Virtual Reality

Shailey Minocha and Ana-Despina Tudor in collaboration with Steve Tilling (Field Studies Council) and Matt Kam (Google)

31 October 2017



3D virtual environments and virtual reality



Second
Life



Virtual Skiddaw:
3D Geology Field
Trips (Unity 3D)



360-degree
videos in the
browser



Virtual reality
viewers

Mobility

‘As if I have met you’



“...I get a feeling of meeting you face-to-face...even though I engage with avatars, I am aware that behind them there is a real person...”

3D virtual geology field trip – Virtual Skiddaw



360-degree videos in the Chrome browser



VR in brain surgery

<https://www.youtube.com/watch?v=1H9qNaP0W9o>



Ocean: A 360-degree tour of the mysterious, magical corals of Palau;
The Economist

<https://www.youtube.com/watch?v=jvtvFHPRcsY>

3D virtual environments and virtual reality



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360-degree
videos in the
browser



Mobility



Virtual reality
viewers

Google Expeditions kit and demo



Tablet

+



Smartphone

+



Cardboard Viewer

+



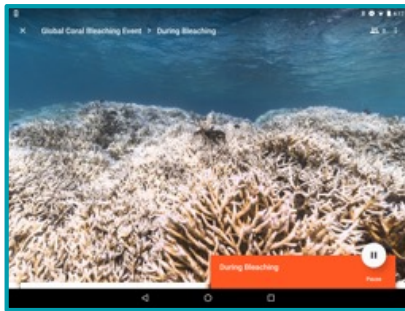
Google Expeditions App

+

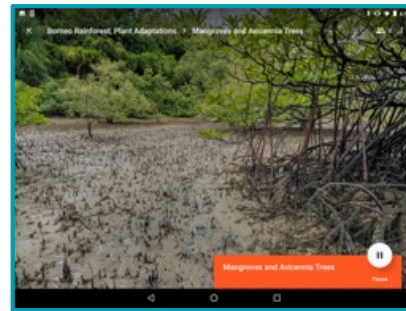


Router

Visiting remote or unsafe locations



The Great Barrier Reef during a bleaching event



Borneo Rainforest – mangroves on salty land

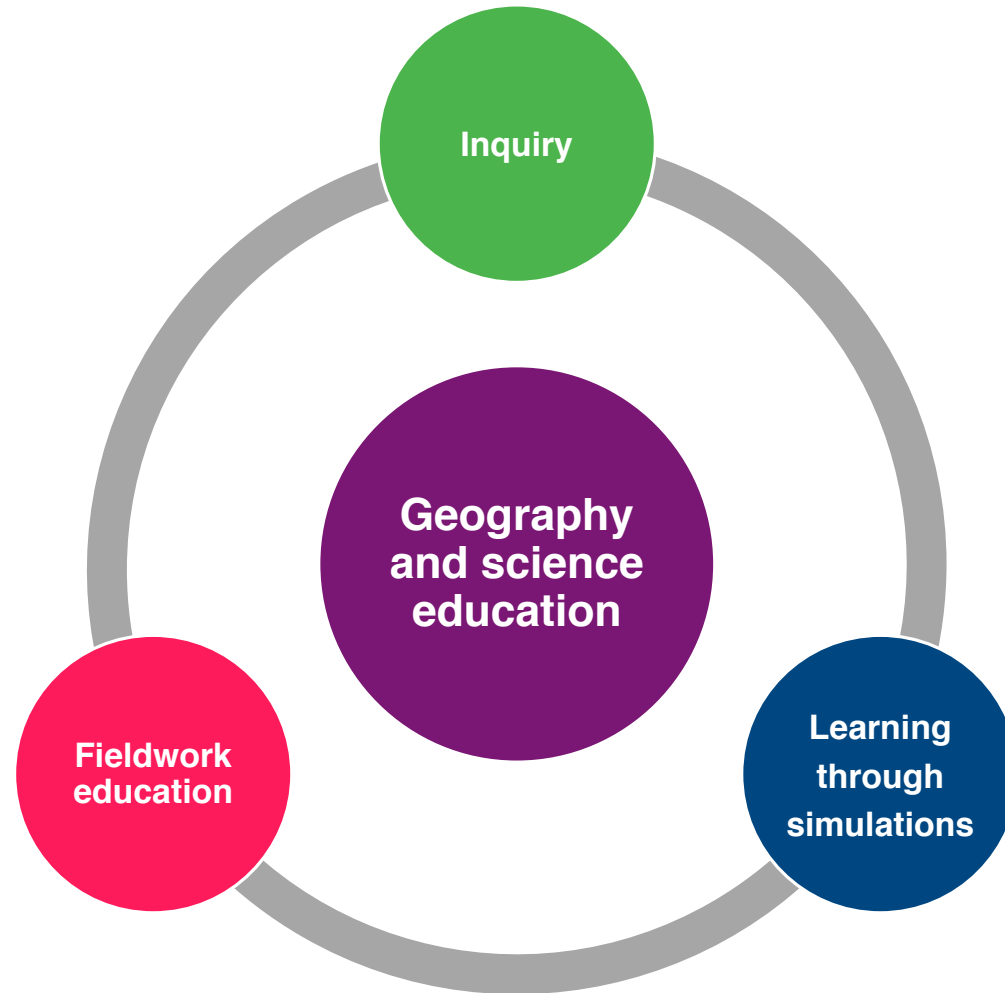


Chernobyl



International Space Station

Google Expeditions – mobile virtual reality



Empirical research

Lessons in schools

science (n=14)
geography (n=10)
students (n=549)
year 4 to year 11

Interviews

science teachers (n=11)
geography teachers (n=9)
curriculum experts (n=6)

Workshops

field workers (n=19)
educators (n=55)

Class preparation



Inquiry-based learning activity sheet

Tropical Rainforests

Activity 1: Now that you have looked at the Tropical Rainforests in Virtual Reality, please write down questions you have about the characteristics of Tropical Rainforests.

Why are certain plants found in rainforests? m.

Could some trees evolve and adapt to have transparent leaves so other plants get more sunlight? H.

How do some plants adapt so well and others don't? H.

Affordances



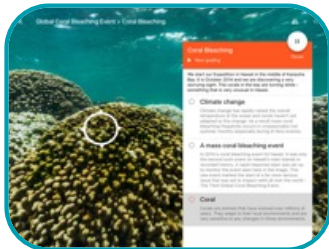
360-degree visual authenticity



360-degree navigation



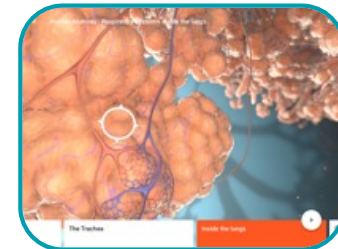
3D view



Emphasis *and* In-situ contextual information



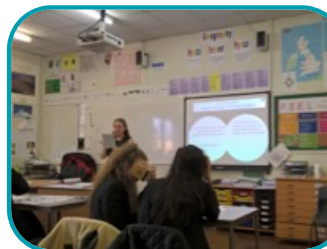
First-person perspective



Simulation



Single-user handling



Synthesis



Visualisation

Geographical or scientific inquiry



Questioning



Inquiry-based learning

Higher-order question:

“Can the colour of the coral before it’s been drained come back?”
(Year 8, Geography, Climate Change and The Great Barrier Reef Expeditions)

Teacher’s comment:

“**You’d need to explain why**, the fact that it was variable on the coral. It links to the idea of resilience” (Geography teacher)

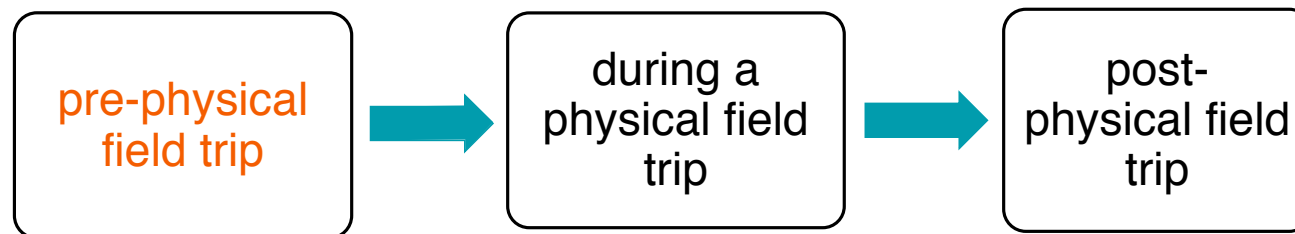
Higher-order question:

“How did the mangrove leaves adapt to take in the salt?”
(Year 10, Geography, Borneo: Plant Adaptations Expedition)

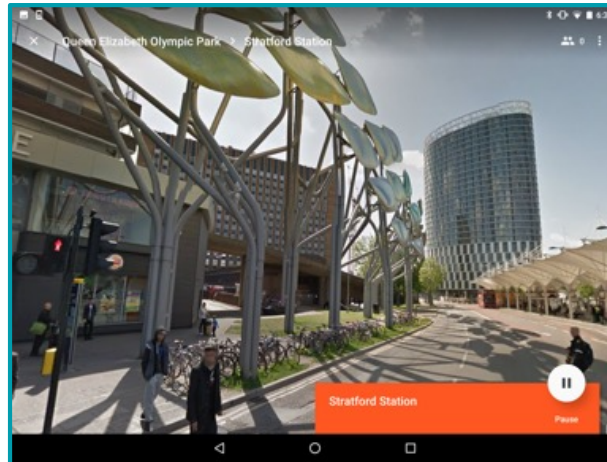
Teacher’s comment:

“That’s really interesting because they’re asking why now. **They know they do, now they want to know how**” (Geography teacher)

Virtual reality for fieldwork education

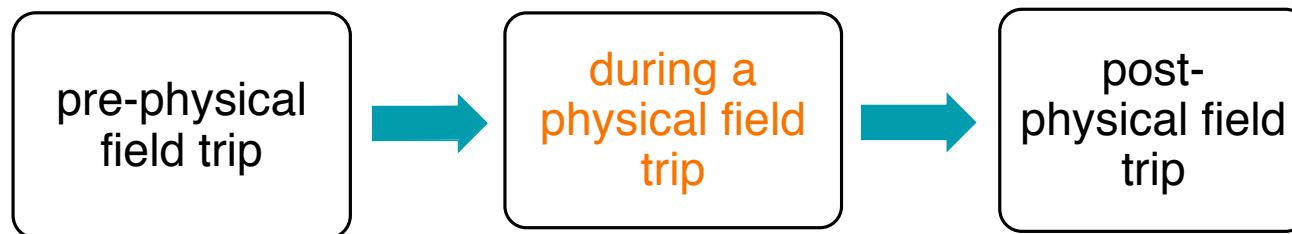


Pre-physical field trip



“Familiarisation with locations:
Allow students to plan ahead for how long it will take them to
access the site and to carry out the physical measurements.”

During a physical field trip

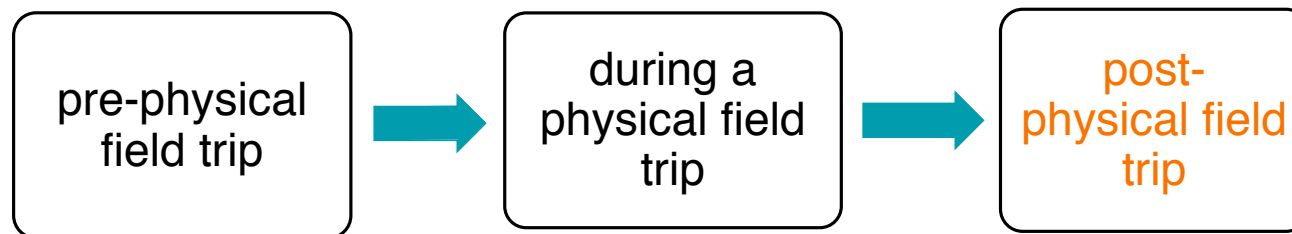


Global to local



“ It helped me to understand the Chilterns is an area of natural beauty compared to some places in the world. It helped me to feel more caring about the Chilterns. ”

After a physical field trip



Local to global



“ We did go on a little tour of the graveyard to look at how rocks are being used in the churchyard and in the church, so GE is going to be taking you to places where I can't actually take you because it's too far and it's too expensive. ”

Learning through simulations



“ the animation was very realistic; therefore, I could take more knowledge away from the lesson [...] these images can [...] help me explain about the respiratory system in a much larger amount of detail. ”

The future



Questions and comments

Project website:

<http://www.shaileyminocha.info/google-expeditions/>; has links to blog-posts

Email addresses:

[\(shailey.minocha; ana.tudor\)@open.ac.uk](mailto:(shailey.minocha; ana.tudor)@open.ac.uk)

Twitter:

[@ShaileyMinocha](https://twitter.com/ShailyMinocha); [@AATudor](https://twitter.com/AATudor); [@Save_Fieldwork](https://twitter.com/Save_Fieldwork) (Steve Tilling); [@matthewkam](https://twitter.com/matthewkam)

